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IS 11777-1 (1986): Circular Connectors for Radio and Associated Sound Equipment for Frequencies Below 3 Mhz Including Dc, Part 1: Test Schedule and Requirements [LITD 3: Electromechanical COmponents and Mechnical Structures for Electronic Equipment]

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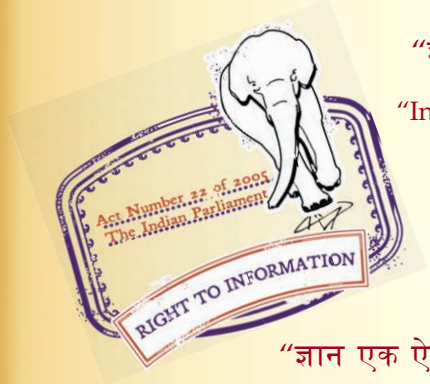

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Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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Indian Standard

SPECIFICATION FOR CIRCULAR CONNECTORS FOR RADIO AND ASSOCIATED SOUND EQUIPMENT FOR FREQUENCIES BELOW 3 MHz INCLUDING DC

PART 1 TEST SCHEDULE AND REQUIREMENTS

UDC 621·316·541 029·42/·53-434·1 : 621·396·6

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Indian Standard

SPECIFICATION FOR CIRCULAR CONNECTORS FOR RADIO AND ASSOCIATED SOUND EQUIPMENT FOR FREQUENCIES BELOW 3 MHz INCLUDING DC

PART 1 TEST SCHEDULE AND REQUIREMENTS

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(*Continued on page* 2)

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Indian Standard

SPECIFICATION FOR CIRCULAR CONNECTORS FOR RADIO AND ASSOCIATED SOUND EQUIPMENT FOR FREQUENCIES BELOW 3 MHz INCLUDING DC

PART 1 TEST SCHEDULE AND REQUIREMENTS

0. FOREWORD

0.1 This Indian Standard (Part 1) was adopted by the Indian Standards Institution on 26 December 1986, after the draft finalized by the Connectors for Electronic Equipment Sectional Committee had been approved by the Electronics and Telecommunications Division Council.

0.2 This standard (Part 1) is one of the Indian Standards on low frequency connectors below 3 MHz used in electronic equipment and shall be used in conjunction with IS : 9647-1986 General requirements and methods of tests for low frequency connectors below 3 MHz including dc (*first revision*) Subsequent parts of this standard will cover detail specifications for specific types of connectors.

0.3 While preparing this standard assistance has been derived from the following publications:

IEC Pub 130-9 (1971) Connectors for frequencies below 3 MHz: Part 9 Circular connectors for radio and associated sound equipment. International Electrotechnical Commission.

IEC Pub 130-9A (1975) First supplement to Publication 130-9 (1971) Connectors for frequencies below 3 MHz: Part 9 Circular connectors for radio and associated sound equipment. International Electrotechnical Commission.

IEC Pub 130-9B (1975) Second supplement to Publication 130-9 (1971) Connectors for frequencies below 3 MHz: Part 9 Circular connectors for radio and associated sound equipment. International Electrotechnical Commission.

JSS 50831 (1972) Detail specification for connectors circular audio, issued by Directorate of Standardization, Ministry of Defence.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with

IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 1) covers the test schedule and requirements for circular connectors for radio and associated sound equipment, for frequencies below 3 MHz including dc.

2. TERMINOLOGY

2.1 For the purpose of this standard, terms and definitions given in IS : 1885 (Part 40)-1974† and IS : 9647-1986‡ shall apply.

3. CLIMATIC CATEGORY

Climatic category : 25/021/70, Temperature range: −25°C to +70°C.

Damp heat (steady state): 21 days

4. TYPE DESIGNATION

4.1 Connectors according to this standard shall be designated by:

i) Reference to this Indian Standard,

ii) The letters IS representing Indian Standard, and

iii) A two-digit number denoting the type of connector.

4.2 The type designation shall be given in accordance with **4.1**, for example:

XXXX IS — YY

where

XXXX reference number of this Indian Standard,

IS denotes Indian Standard, and

YY number which denotes the type of connector.

5. CONTACT ARRANGEMENTS AND CONNECTIONS

5.1 The contact arrangements and the connections of each type of connectors are shown in Table 1.

6. ELECTRICAL RATINGS

6.1 The ratings shall be as given below:

a) Voltage rating: 34 V ac or dc

b) Current rating: 2 A ac or dc

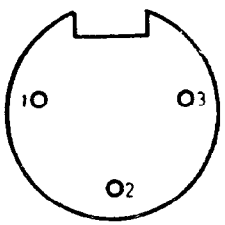
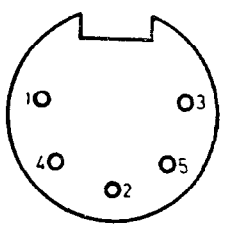
*Rules for rounding off numerical values (*revised*).

†Electrotechnical vocabulary: Part 40 Connectors.

‡General requirements and methods of tests for low frequency connectors below 3 MHz including dc (*first revision*).

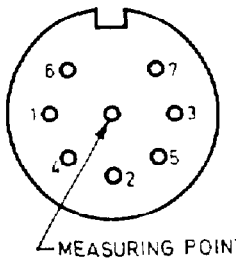
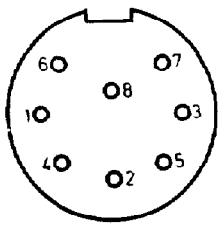
TABLE 1 CONTACT ARRANGEMENTS AND CONNECTIONS

(*Clauses* 5.1)

Contact Arrangement (*See* Note 1)	Type Designation		Application		Connections (*See also* Appendix A)				
	Pin connector	Socket connector			(1)	(2)	(3)	(4)	(5)
	11777 IS-01	11777 IS-02	Microphone	Monaural system (balanced)	Hot lead		Return lead		
				Monaural system (unbalanced)	Hot lead				
	11777 IS-03	11777 IS-04	Microphone	Stereophonic system (balanced)	Hot lead of left-hand channel		Return lead of left-hand channel	Hot lead of right-hand channel	Return lead of right-hand channel
				Stereophonic system (unbalanced)	Hot lead of left-hand channel			Hot lead of right-hand channel	
			Record player (*See* Note 2)	Monaural system		Screening; earth	Hot lead		Connected to 3
				Stereophonic system			Hot lead of left-hand channel		Hot lead of right-hand channel
			Tape-recorder (*See* Note 2)	Monaural system	Modulating signal		Reproducing signal	Connected to 1	Connected to 3
				Stereophonic system	Modulating signal of left-hand channel	*See* Note 3	Reproducing signal of left-hand channel	Modulating signal of right-hand channel	Reproducing signal of right-hand channel

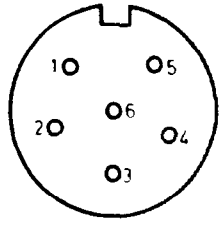
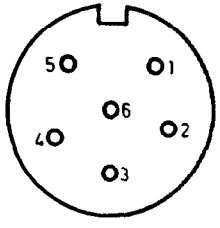
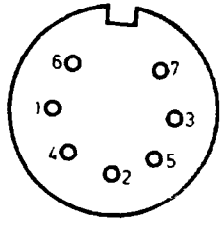
(*Continued*)

TABLE 1 CONTACT ARRANGEMENTS AND CONNECTIONS — *Contd*

Contact Arrangement (*See* Note 1)	Type Designation		Application		Connections (*see also* Appendix A)						
	Pin Connector	Socket Connector			(1)	(2)	(3)	(4)	(5)	(6)	(7)
	11777 IS-05	11777 IS-06	Connector for stereo-tape player to car radio	Monaural system	Modulating signal (recording)	Screening; earth (*See* Note 3)	Reproducing signal (playback)	Connected to 1	Connected to 3	Return load for supply voltage	Switched supply voltage
				Stereophonic system	Modulating signal of left-hand channel		Reproducing signal of left-hand channel	Modulating signal of right-hand channel	Reproducing signal of right-hand channel		
	11777 IS-07	11777 IS-08	(Under consideration)								

(*Continued*)

TABLE 1 CONTACT ARRANGEMENTS AND CONNECTIONS — *Contd*

Contact Arrangement (*See* Note 1)	Type Designation		Application	Connections (*see also* Appendix A)						
	Pin Connector	Socket Connector		(1)	(2)	(3)	(4)	(5)	(6)	(7)
	11777 IS-09	11777 IS-10	Connection between mono car radio and tape recorder with power switching	Modulating signal from demodulator (recording)	Reproducing signal to audio amplifier (playback)	Screen/ earth	Switched supply voltage (*Max* 0·3 A)	Supply voltage	Auxiliary functions or connected to 3 or 5 for screens	
			Connection between video tape recorder and TV receiver	(Under consideration)						
	11777 IS-12	11777 IS-11	Connection between mono car radio and tape recorder with power switching	Modulating signal from demodulator (recording)	Reproducing signal to audio amplifier (playback)	Screen/ earth	Switched supply voltage (*Max* 0·3 A)	Supply voltage	Auxiliary functions or connected to 3 or 5 for screens	
			Connection between video tape recorder and TV receiver	(Under consideration)						
	11777 IS-13	11777 IS-14	For microphones in non-severe environments	(Under consideration)						

Note 1 — The contact pattern and the connections of the connectors are specified in Table 1. The numbering of the contacts is shown as seen on the mating face of the connector.

Note 2 — The same connectors are used for monaural and stereophonic systems.

Note 3 — In normal cases, it is recommended to connect the shell of the plug to terminal 2 of the connectors to ensure that the screen is earthed. In special cases, however, it may be necessary to separate the screen from earth. The screen is then connected to the contact spring which is in contact with the protective collar of the pin connector, but this termination is not shown.

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7. MATERIALS AND WORKMANSHIP

7.1 Provisions of **4** of IS : 9647-1986* shall apply.

8. MARKING

8.1 Provisions of **6** of IS : 9647-1986* shall apply.

9. TESTS

9.1 General — The test schedule specifies the tests, the order in which they shall be carried out and the requirements to be met.

9.2 Conditions of Tests — The provisions of **8** of IS : 9647-1986* shall apply.

9.3 Classification of Tests — The provisions of 7 of IS : 9647-1986* shall apply.

9.4 Test Schedule

9.4.1 *Type Tests* — The test schedule for type tests including the sequence of tests and the number of samples shall be as specified in Table 2.

9.4.1.1 The manufacturer shall submit 22 mating pairs of the connector for which type approval is desired. If the approval is desired for more than one type, the manufacturer shall submit three additional samples in each type, which shall be subjected to the tests of zero group and first group only.

9.4.2 *Routine Tests* — The following tests shall be carried out in the order stated:

a) Visual examination (*see* **9** of IS : 9647-1986*).

b) Voltage proof (duration 5 seconds) (*see* **12.5** of IS : 9647-1986*).

9.4.3 *Acceptance Tests* — Two groups of samples (Group A and Group B) shall be selected preferably at random from the lot that has passed routine tests stated in **9.4.2** above. Each group of connectors shall be subjected to the tests in the order given in Table 3.

---

*General requirements and methods of tests for low frequency connectors below 3 MHz including dc (*first revision*).

TABLE 2 SCHEDULE OF TYPE TESTS

(*Clause* 9.4.1)

Sl No.	Test	Cl Ref of IS : 9647-1986*	Condition of Test	Requirements
(1)	(2)	(3)	(4)	(5)
1.	*Zero Group* (*all 22 samples*)			
	a) Visual examination	9	—	
	b) Dimensions	10	—	*See* relevant specification
	c) Polarisation	13.14	—	—
	i) Polarising device	13.14.1	—	—
	ii) Mismating	13.14.2	—	—
	d) Insertion and withdrawal force	14.1	—	—
	e) Contact resistance	12.1	—	10 mΩ (*Max*)
	f) Voltage proof	12.5	500 V ac (rms)	—
	g) Insulation resistance	12.4	100 V dc	1 000 MΩ (*Min*)
	h) Sealing	16.5	A pressure of 17·24 kPa shall be applied to the contact face and then to the rear of the connector	There shall be no leakage
2.	*First Group* (*6 samples*)			
	a) Soldering	13.15	—	—
	b) Acceleration (Steady state)	14.10	170 m/s²	—
	i) Visual examination	19	—	—
	ii) Contact resistance	12.1	—	The value shall not exceed 1·5 times the initial value specified
	iii) Sealing	16.5	*See* 1 (h)	*See* 1 (h)
	c) Bump	14.11	4 000 bumps, 400 m/s² & duration 6 ms	—
	i) Visual examination	9	—	—
	ii) Contact resistance	12.1	—	*See* 2 (b) (ii)
	iii) Sealing	16.5	*See* 1 (h)	*See* 1 (h)

*General requirements and methods of tests for low frequency connectors below 3 MHz including dc (*first revision*).

(*Continued*)

TABLE 2 SCHEDULE OF TYPE TESTS — *Contd*

Sl No.	Test	Cl Ref of IS : 9647-1986*	Condition of Test	Requirements
(1)	(2)	(3)	(4)	(5)
	d) Vibration	14.13	10 to 55 Hz, 0·75 mm, duration: 10 h	—
	i) Visual examination	9	—	—
	ii) Contact resistance	12.1	—	*See* 2 (b) (ii)
	iii) Sealing	16.5	*See* 1 (h)	*See* 1 (h)
	e) Shock	14.12	500 m/s²	—
	i) Visual examination	9	—	—
	ii) Contact resistance	12.1	—	*See* 2 (b) (ii)
	iii) Sealing	16.5	*See* 1 (h)	*See* 1 (h)
	f) Rapid change of temperature	16.4	—	—
	i) Visual examination	9	—	The connectors shall be capable of being mated and unmated
	ii) Contact resistance	12.1	—	*See* 2 (b) (ii)
	g) Dry heat	16.2.1	70°C	—
	i) Visual examination	9	—	—
	h) Damp heat accelerated (first cycle)	16.2.2	—	—
	i) Visual examination	9	—	—
	j) Cold	16.2.3	−25°C	—
	i) Visual examination	9	—	—
	ii) Insertion & withdrawal force	14.1	—	—
	k) Low air pressure	16.2.4	8·5 kPa	—
	i) Voltage proof	12.5	Test voltage: 300 V ac (rms) 5 cycles	—
	m) Damp heat accelerated (remaining cycles)	16.2.5	5 cycles	—
	i) Visual examination	9	—	—
	ii) Voltage proof	12.5	500 V ac (rms)	—

*General requirements and methods of tests for low frequency connectors below 3 MHz including dc (*first revision*).

(*Continued*)

TABLE 2 SCHEDULE OF TYPE TESTS — *Contd*

Sl No.	Test	Cl Ref of IS : 9647-1986*	Condition of Test	Requirements
(1)	(2)	(3)	(4)	(5)
	iii) Insulation resistance	12.4	100 V dc	100 MΩ (*Min*)
	iv) Contact resistance	12.1	—	*See* 2 (b) (ii)
	v) Insertion and withdrawal force	14.1	—	—
	vi) Sealing	16.5	*See* 1 (h)	*See* 1 (h)
3.	*Second Group* (*4 samples*)			
	a) Damp heat (long term exposure)	16.3	Duration 21 days	—
	i) Visual examination	9	—	—
	ii) Voltage proof	12.5	500 V ac (rms)	—
	iii) Insulation resistance	12.4	—	100 MΩ (*Min*)
	iv) Contact resistance	12.1	—	*See* 2 (b) (ii)
	v) Insertion withdrawal force	14.1	—	—
	vi) Sealing	16.5	*See* 1 (h)	*See* 1 (h)
4.	*Third Group* (*4 samples*)			
	a) Mechanical endurance	17	Connectors shall be mated and unmated 1 500 times at a rate of 20 mating cycles per minute approximately	—
	i) Visual examination	9	—	—
	ii) Contact resistance	12.1	—	*See* 2 (b) (ii)
	iii) Insertion and withdrawal force	14.1	—	—
	b) Electrical endurance test	18	1 000 h at rated current and +70°C	—

*General requirements and methods of tests for low frequency connectors below 3 MHz including dc (*first revision*).

(*Continued*)

TABLE 2 SCHEDULE OF TYPE TESTS — *Contd*

Sl No.	Test	Cl Ref to IS : 9647-1986*	Condition of Test	Requirements
(1)	(2)	(3)	(4)	(5)
	i) Visual examination	9	—	—
	ii) Voltage proof	12.5	500 V ac (rms)	—
	iii) Contact resistance	12.1	—	*See* 2 (b) (ii)
	iv) Sealing	16.5	—	—
5.	*Fourth Group* (*2 samples*)			
	a) Mould growth	16.6	—	—
6.	*Fifth Group* (*2 samples*)			
	a) Salt mist	16.7	—	—
	i) Visual examination	9	—	—
	ii) Insertion and withdrawal force	14.1	—	—
	iii) Voltage proof	12.5	500 V ac (rms)	—
	iv) Insulation resistance	12.4	100 V dc	The value shall be recorded
	v) Contact resistance	12.1	—	The value shall be recorded
7.	*Sixth Group* (*2 samples*)			
	a) Immersion		*See* Appendix B	—
8.	*Seventh Group* (*2 samples*)			
	a) Contact depression	13.9	For 5 contact connector a) depression: 2 mm b) Force required: 45 to 75 N c) Force required to depress individual contact: 9 to 16 N	—
	b) Pull	14.8	—	—

*General requirements and methods of tests for low frequency connectors below 3 MHz including dc (*first revision*).

TABLE 3 SCHEDULE OF ACCEPTANCE TESTS

(*Clause* 9.4.3)

TEST	CLAUSE REF OF IS : 9647-1986*	AQL (PERCENT DEFECTIVE)	INSPECTIONS LEVEL (IS : 10673-1983†)	D/ND‡
GROUP 'A'				
Insertion and withdrawal force	14.1	I	II	ND
Contact resistance	12.1			
Insulation resistance	12.2			
GROUP 'B'				
Sub-group 1				
Dimensions and mass	10	4	S-3	ND
Sub-group 2				
Mechanical endurance test	17	4	S-3	ND
Electrical endurance test (short term)	18			
Sub-group 3				
Soldering	13.14	4	S-3 .	D
Bump	14.11			
Climatic sequence	16.2			
Pull	14.8			

NOTE — Samples which have been subjected to destructive tests shall not be returned to the lot.

*General requirements and methods of tests for low frequency connectors below 3 MHz including dc (*first revision*).

†Sampling plans and procedures for inspection by attributes for electronic items.

‡D = destructive and ND = non-destructive.

APPENDIX A

(*Table* 1)

DESCRIPTION OF THE CONNECTORS

A-1. FREE THREE-PIN CONNECTOR FOR MICROPHONE, 11777 IS-01

A-1.1 This connector mates with the socket connector 11777 IS-02 and serves to connect microphones to tape recorders. The electrical connections are given in Table 1.

A-1.2 The screening collar surrounding the pins is made of metal and its continuation inside the plug ensures electrical screening.

The rib inside the screening collar together with the corresponding groove of the socket connector prevents incorrect insertion of the plug. A spring inside the socket connector provides for contact between the collar and the screening of the socket connector.

A-2. FIXED THREE-SOCKET CONNECTOR FOR SOUND EQUIPMENT, 11777 IS-02

A-2.1 This connector mates with the pin connector and serves to connect a microphone to the equipment. The electrical connections are given in Table 1.

A-2.2 Supporting flange and shell may be of metal or plastic as required. The screening collar of the pin connector extends into the socket connector so that in most cases adequate screening is ensured, even when the shell is made of plastic. The shell has a spring contact with termination for a screen or earth lead, ensuring proper contact with the screening collar of the pin connector.

A-2.3 The metal version has an electrical connection between the spring contact and the shell. The groove in the insulator of the socket connector together with the rib in the screening collar of the pin connector prevents incorrect insertion of the plug.

A-2.4 The blind holes in the insulator allow insertion of a five-pole pin connector (11777 IS-03) into the socket connector.

If the blind holes are undesirable in view of the possibility of incorrect insertion, agreement between customer and manufacturer should be reached to omit these.

A-3. FREE FIVE-PIN CONNECTOR FOR RECORD PLAYER AND TAPE RECORDER, 11777 IS-03

A-3.1 This connector mates with the five-socket connector 11777 IS-04 and serves to connect a record player or a tape recorder to a radio receiver or to sound equipment. The electrical connections are given in Table 1.

A-3.2 Except for the number of contacts, this version corresponds to the three-pole socket connector, described in **A-1**.

A-4. FIXED FIVE-SOCKET CONNECTOR FOR RECORD PLAYER AND TAPE RECORDER, 11777 IS-04

A-4.1 This connector mates with the pin-connector 11777 IS-03 and serves to connect a record player or a tape recorder to an amplifier or to sound equipment. The electrical connections are given in Table 1.

A-4.2 Except for the number of contacts, this version corresponds to the three-pole socket connector described in **A-2.**

A-5. FREE SEVEN-PIN CONNECTOR FOR STEREOTAPE PLAYER WITH CAR RADIO, 11777 IS-05

A-5.1 This connector mates with the socket connector 11777 IS-06. The electrical connections are given in Table 1.

A-6. FIXED SEVEN-SOCKET CONNECTOR FOR STEREOTAPE PLAYER WITH CAR RADIO, 11777 IS-06

A-6.1 This connector mates with the free pin connector 11777 IS-05. The electrical connections are given in Table 1.

A-7. FREE SEVEN-PIN CONNECTOR FOR MICROPHONE WITH REMOTE CONTROL, 11777 IS-07

A-7.1 This connector mates with the fixed socket connetor 11777 IS-08. The electrical connections are given in Table 1.

A-8. FIXED SEVEN-SOCKET CONNECTOR FOR MICROPHONE WITH REMOTE CONTROL, 11777 IS-08

A-8.1 This connector mates with the free pin connector 11777 IS-07. The electrical connections are given in Table 1.

A-9. FREE SIX-PIN CONNECTOR FOR VARIOUS APPLICATIONS, 11777 IS-09

A-9.1 This connector mates with the fixed socket connector 11777 IS-10. The electrical connections are given in Table 1.

A-10. FIXED SIX-SOCKET CONNECTOR FOR VARIOUS APPLICATIONS, 11777 IS-10

A-10.1 This connector mates with the free pin connector 11777 IS-09. The electrical connections are given in Table 1.

A-11. FREE SIX-SOCKET CONNECTOR FOR VARIOUS APPLICATIONS, 11777 IS-11

A-11.1 This connector mates with the fixed pin connector 11777 IS-12. The electrical connections are given in Table 1.

A-12. FIXED SIX-PIN CONNECTOR FOR VARIOUS APPLICATIONS, 11777 IS-12

A-12.1 This connector mates with the free socket connector 11777 IS-11. The electrical connections are given in Table 1.

A-13. FREE EIGHT-PIN CONNECTOR FOR MICROPHONE AND OTHER APPLICATIONS, 11777 IS-13

A-13.1 This connector mates with the fixed socket connector 11777 IS-14. The electrical connections are given in Table 1.

A-14. FIXED EIGHT-SOCKET CONNECTOR FOR VARIOUS APPLICATIONS, 11777 IS-14

A-14.1 This connector mates with the free pin connector 11777 IS-13. The electrical connections are given in Table 1.

APPENDIX B

[*Table* 2, *Item* 7 (a)]

IMMERSION

B-1. CONDITION OF TEST — The connectors shall be immersed in tap water in a depth of 1·83 m for 48 hours and the following details shall apply:

a) Plug shall be assembled to test cables and the length of the cable shall be such that the cable extends a few decimetres outside the tank.

b) Receptacle shall be sealed completely against leakage or shall be mounted by their normal means to the wall of the tank so that the terminal end of the shell is outside the tank.

c) 50 percent of the connectors shall be tested in the mated condition and the other 50 percent unmated.

d) Upon completion of the test all excess moisture shall then be removed and the connector dried at room temperature by compressed air for a period of 5 minutes.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2